

### Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Thus, in order to clarify that the urethane resin (i) has substantially no reactive group (isocyanate group) with the polyamine (iii), claims 1 and 15 have been amended to specify the molar ratio of the total active hydrogen atom of the components (B) and (D) relative to 1 mol of the isocyanate group of the polyisocyanate compound (A), based on the paragraph [0048] of the specification.

That is, the following phrase has been incorporated into claims 1 and 15:

"the proportion of the total amount of components (B), (C) and (D) each having an active hydrogen atom is, as the total amount of the active hydrogen atom, about 0.8 to 1.2 mol relative to 1 mol of the isocyanate group of the polyisocyanate compound (A)".

In relation to the component (C), the phrase ", and if any residue of a polyol compound (C), each of the residues (B) and (C) bonding" is also incorporated into claims 1 and 15, to provide antecedent basis for the component (C).

Further, the claims have been amended to clarify that the polyamine (iii) is not a reactive component but a non-reactive compound with the urethane resin (i). Thus, based on paragraph [0062], amended claims 1 and 15 specify that the polyamine (iii) is a component added to a dispersion of the swelling inorganic layered compound (ii), a dispersion containing the aqueous polyurethane resin (i), or a dispersion containing the aqueous polyurethane resin (i) and the swelling inorganic layered compound (ii).

Further, "a polyamine compound" has been amended to "a polyamine" based on page 21, lines 13-14 of the specification, because the Examiner asserts that "the instant claims recite a polyamine compound, and a polyurethane resin, which does not imply that these are two separate resins."

New claims 22 and 23 have been added to the application. New claim 22 expressly recites that the polyamine is present in the free form in the composition. Considering the disclosures in paragraphs [0053] to [0059], it is apparent that one of ordinary skill in the art would clearly recognize that Applicants had possession of the use of free polyamines in the composition.

New claim 23 refers to the polyamine interposed between the layers of the inorganic layered compound based on page 21, lines 1-9 of the specification.

All of the four obviousness-type double patenting rejections set forth by the Examiner in items 2-4 and 6 beginning on page 2 of the Office Action, as well as the Examiner's position as set forth in item 5 and the corresponding rejections under 35 U.S.C. 103(a) as set forth in item 7-10, are respectfully traversed.

#### Aqueous Dispersion

The Examiner asserts, with respect to claims 1, 3, 15 and 17, that the patent claims of Uchida et al. (USP 6,979,493, or USP 6,569,533) disclose an aqueous dispersion comprising an aqueous polyurethane resin and a neutralizing agent, in which the polyurethane resin is generated through a reaction of a diisocyanate with a polyhydroxycarboxylic acid, a diol and a diamine.

#### Layered Inorganic Compound and Polyamine

Further, with respect to the aqueous polyurethane resin recited in claims 1, 6 and 15, the Examiner asserts that Uchida et al. claims a water swellable layered inorganic compound (claims 6-8) and teaches that a polyamine can be used together with the diamine chain extending compound (col. 5, lines 9-11).

#### The Ratio of Acid Group of Polyurethane Relative to Basic Nitrogen Atom of Polyamine

With regard to the portion of the acid group of the polyurethane resin relative to the basic nitrogen atom of the polyamine, the Examiner asserts that Production Example 9 uses hydrogenated XDI, dimethylol propionic acid and ethylene glycol as well as a solvent and triethylamine neutralizer, and Production Example 10 uses **these** in a mixture of 500g to 6g of 3-[N-(2-aminoethyl)amino]propyl methyl dimethoxy silane.

#### Zilg et al. Reference

Moreover, the Examiner asserts that Zilg et al. teach a filler mixture comprising a layered silicate and a mineral filler for use with thermosetting resins including polyurethane, and the swellable clays are treated with swelling agents including aromatic amines and polyamines to prepare the layered silicates (page 2, paragraphs 2-4).

#### Obviousness

The Examiner asserts (a) obviousness of claims 1-21 over USP 6,979,493 (Prior Publication: US 2003/0207122) or USP 6,569,533 in view of Harada et al. (US 5,981,029) (Double Patenting I and II), and

(b) obviousness of claims 1-21 over USP 6,979,493 (US 2003/0207122) or USP 6,569,533 (US 2003/0207122) in view of Zilg et al. (WO 01/04193) (Double Patenting III and IV).

#### Response to Arguments

##### (i) Role of Polyamine

The Examiner alleges in the "Response to Arguments" section of the Office Action that "Uchida teaches that a polyamine can be used together with the diamine chain extending compound (see col 5 line 9-11) in the preparation of the polyurethane. The polyamine can also be used as a crosslinking agent (see col 4 lines 49). In this case, the polyamine would not be reacted into the backbone of the urethane, but used after the urethane and layered compound were combined, to cure the composition. In either case, Uchida specifically teaches the inclusion of a polyamine in the resin composition". (page 18 of the Office Action)

##### (ii) Polyamine being present in the free form

The Examiner further alleges that

"although this particular recitation of Uchida does not specify a polyamine present in the free form in the aqueous polyurethane resin, the **instant claims do not require that the polyamine be present in free form**. In fact, the instant claims recite a polyamine compound, and a polyurethane resin, which does not imply that these are two separate resins." (the bridging section of page 18 to page 19 of the Office Action)

##### (iii) Polyamine interposed between the layers of the compound

The Examiner asserts that

"the features upon which applicant relies (i.e., polyamine interposed between the layers of the inorganic compound) are not recited in the rejected claim(s)" (page 19 of the Office Action).

##### (iv) Polyamine as an added component

The Examiner further asserts that "applicant's specification indicates that the polyamine may be added --- it is not clear that the polyamine would not react with the polyurethane" and the claims relate to a product rather than a process for producing the product (page 19 of the Office Action)

#### The Cited References

Uchida et al. (USP 6,979,493, US 2003/0207122) and Uchida et al. (USP 6,569,533).

USP 6,979,493 is a divisional application based on USP 6,569,533. Thus, the references have the same contents with each other.

#### Counter-arguments

As apparent from the amended claims, **the polyamine is present in the free form in the aqueous resin composition**. That is, from the molar ratio of the active hydrogen atoms of the components (B), (C) and (D) relative to the isocyanate group of the polyisocyanate compound (A), the resultant polyurethane resin has substantially no reactive isocyanate group. Further, even if the polyurethane resin has a little amount of isocyanate group, since the isocyanate group reacts with water easily in the aqueous form, the residual isocyanate group of the aqueous polyurethane resin or resin composition is converted into non-reactive urethane linkage to remove the isocyanate group. Thus, reaction of the aqueous polyurethane resin with the polyamine would not be expected to occur by one of ordinary skill in the art.

Furthermore, the polyamine is recited as a component added to the dispersion in order to clarify that the polyamine (iii) is a non-reactive component with the urethane resin (i).

As apparent from the above arguments, the aqueous polyurethane resin is not reactive with the polyamine and thus the polyamine is present in the free form. None of the cited references disclose or suggest these technical features of the claimed subject matter. Further, another technical feature of the claimed subject matter, i.e. "the proportion of the acid group of the polyurethane resin relative to the basic nitrogen atom of the polyamine" is also not suggested by the cited references.

For these reasons, Applicants take the position that all of the obviousness-type double patenting rejections, as well as all of the prior art rejections under 35 U.S.C. 103(a) should be withdrawn.

#### Examiner's Comments

(a) Reactivity of Polyamine

The Examiner alleges that Uchida et al. teach that the polyamine can be used together with the diamine chain extending compound (col 5, lines 9-11) in the preparation of the polyurethane, and that the polyamine can also be used as a crosslinking agent (col 4, line 49).

Applicants respectfully submit that the Examiner's comments are not logical and include inconsistencies from a technical viewpoint. That is, if Uchida et al. use the polyamine together with the diamine chain extending compound or the diamine crosslinking agent in the preparation of the polyurethane according to the Examiner's comments, the polyamine as well as the diamine should be incorporated naturally into the backbone of the polyurethane since the amino group of the polyamine has the same reactivity as the amino group of the diamine with the isocyanate group of the polyisocyanate compound (A). Therefore, the following interpretation by the Examiner is wrong:

"the polyamine would not be reacted into the backbone of the urethane, but used after the urethane and layered compound were combined, to cure the composition.

In either case, Uchida specifically teaches the inclusion of a polyamine in the resin composition". (page 18 of the Office Action)

It should be noted that Uchida et al. never disclose that **the polyamine** can also be used as a crosslinking agent, as apparent from the disclosure of Uchida et al. that "**a diamine** compound may be used as a chain-extending agent or **a crosslinking agent**" (see col, 4 lines 48-49 of US '533).

(b) Production Example 10

The Examiner alleges that after illustrating components of the polyurethane in Production Example 9, Production Example 10 uses **these** in a mixture of 500g to 6g of 3-[N-(2-aminoethyl)amino]propyl methyl dimethoxy silane).

However, an aqueous dispersion of a polyurethane resin is prepared from the components (A), (B), (C) and (D) in Production Example 9. That is, the polyurethane resin is a reaction product of the components (A), (B), (C) and (D). Therefore, Production Example 10 of Uchida et al. never uses **these** components.

Further, 3-[N-(2-aminoethyl)amino]propyl methyl dimethoxy silane is not a chain-extending agent but an additive which is added to the aqueous dispersion of a polyurethane resin. This is clearly proved by the fact that Uchida et al. recite 3-[N-(2-aminoethyl)amino]propyl


methyl dimethoxy silane not as the chain-extending agent but as the additive (see the section [Diamine Component] in column 4 and column 8, line 58 to column 9, line 38 of US '533).

Thus, 3-[N-(2-aminoethyl)amino]propyl methyl dimethoxy silane used in Production Example 10 does not have the role of the polyamine of the presently claimed invention.

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied references, and that the rejections should therefore be withdrawn, placing the application in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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